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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,005	11/26/2003	Alexei A. Erchak	16459-012001	7534
26161	7590	01/14/2005	EXAMINER	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			NADAV, ORI	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/724,005

Applicant(s)

ERCHAK ET AL.

Examiner

ori nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-11 and 15-76 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 39-76 is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-11 and 15-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/18/04</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7-11 and 15-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (6,469,324).

Wang teaches in figures 13 and 14 and related text a method of making a light-emitting device, the method comprising: connecting a layer of a reflective material 182A with a layer of p-doped material 16, wherein:

the light-emitting device comprises a multi-layer stack of materials including the layer of p-doped material 16, a light-generating region 122, and a first layer 14A;

the first layer 14A includes a surface having a dielectric function that varies spatially according to a pattern; and

the reflective material 182A is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material.

Wang does not state in the embodiment of figures 13-14 bonding the layer of a reflective material 182A with the layer of p-doped material 16.

Wang teaches in the embodiment of figure 10 bonding the layer of a reflective material with the LED wherein the layer of p-doped material is located (column 5, lines 50-52).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to bond the layer of a reflective material 182A with the layer of p-doped material 16 in Wang's device in order to provide good contact between the layers of the device.

Regarding claims 2-4, 11 and 15-19, Wang teaches before bonding the layer of the reflective material with the layer of p-doped material, bonding the first layer with a substrate, the multi-layer stack of materials being between the substrate and the layer of reflective material (column 6, lines 12-57),

forming a bonding layer 180A between the first layer and the substrate,

removing the substrate,

wherein removing the substrate results in the surface of the first layer becoming substantially flat,

forming the pattern in the surface of the first layer, forming the pattern includes using nanolithography, wherein the pattern has features that are greater than about  $A/5$ , where  $A$  is a wavelength of light that can be emitted by the first layer, and

disposing a substrate on the layer of reflective material, and

disposing a current-spreading layer between the first layer and the light-generating region.

Regarding claims 20-22, Wang teaches the light-emitting device is selected from the group consisting of light-emitting diodes, lasers, optical amplifiers, and combinations

thereof, wherein the light-emitting device comprises a light emitting diode, and wherein the light-emitting device is selected from the group consisting of OLEDs, flat surface-emitting LEDs, HBLEDs, and combinations thereof.

Regarding claims 7-8 and 25-26, Wang teaches removing the substrate includes heating a bonding layer disposed between the first layer and the substrate, wherein heating the bonding layer naturally decomposes at least a portion of the bonding layer (column 6, lines 35-57).

Regarding claims 5, 9-10, 24 and 27-28, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use lapping and polishing steps after removing the substrate, and heating the bonding layer by exposing the bonding layer to radiation emitted by a laser and removing the substrate by exposing the substrate using a laser liftoff process in Wang's device in order to improve the bond between the layers of the device.

Regarding claims 23 and 29, Wang teaches disbonding the substrate bonded with the first layer, wherein disbonding the substrate results in the bottom surface of the first layer becoming substantially flat by using lapping. Wang does not explicitly state using planarization to form a planar surface. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to planarize a surface of the first layer after the substrate is disbanded, in Wang's device in order to provide better

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bonding between the layers of the device by a conventional planarizing process. The combination is motivated by the teachings of Wang who points out the need to obtain a clean and planar surface (column 6, lines 25-27).

Regarding claims 30-32, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to planarize a surface of the first layer after the first substrate is disbonded, wherein planarizing the surface of the first layer includes chemical-mechanical polishing the surface of the first layer, such that a roughness of the surface of the first layer is reduced to greater than about  $\lambda/5$ , where  $\lambda$  is a wavelength of light that can be emitted by the first layer, in Wang's device in order to provide better bonding between the layers of the device by a conventional planarizing process.

Regarding claims 33, 35 and 36, Wang teaches that after disbonding the substrate, forming the pattern in the surface of the first layer, wherein the pattern has features that are greater than about  $\lambda/5$ , where  $\lambda$  is a wavelength of light that can be emitted by the first layer,

wherein the first layer comprises a layer of an n-doped material, the multi-layer stack further includes a layer of p-doped material, and the light-generating region is between the layer of p-doped material and the layer of n-doped material.

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Regarding claim 34, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use nanolithography when forming the pattern in order to use conventional methods of forming a pattern.

Regarding claims 37 and 38, the surface of the first layer has features with a size of less than about  $V_5$ , where  $\lambda$  is a wavelength of light that can be generated by the light-generating region and that can emerge from the light-emitting device via the surface of the first layer.

#### ***Allowable Subject Matter***

Claims 39-76 are allowable.

#### ***Response to Arguments***

Applicant argues that Wang does not teach bonding the layer of a reflective material 182A with the layer of p-doped material 124.

The examiner recited layer 16 as being the layer of p-doped material and not layer 124. Although figure 14 depicts a layer of a reflective material 182A being connected with the layer of p-doped material 16, Wang does not state in the embodiment of figures 13-14 bonding the layer of a reflective material 182A with the layer of p-doped material 16. However, Wang teaches in the embodiment of figure 10 bonding the layer of a reflective material with the LED wherein the layer of p-doped material is located (column 5, lines 50-52). It would have been obvious to a person of

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ordinary skill in the art at the time the invention was made to connect the layer of a reflective material 182A with the layer of p-doped material 16 in Wang's device by bonding in order to provide good contact between the layers of the device.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.



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**Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.**

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(571) 272-1660**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink, appearing to read 'Ori Nadav', is positioned above the printed name and title.

O.N.  
1/11/05

ORI NADAV  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 2800